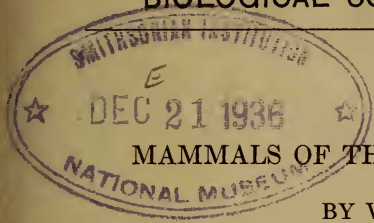


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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON



MAMMALS OF THE DISTRICT OF COLUMBIA.

BY VERNON BAILEY.

INTRODUCTION.

The first formal list of the mammals of the District of Columbia,¹ comprising 38 species, was published in 1896. Since then nine additional species have been taken within the area, many interesting notes have accumulated, a number of technical names have been changed, and the old list has become quite inadequate for the present growing interest in outdoor life. The long-felt need of brief untechnical descriptions of species to aid in the identification of the obscure or rare forms is now supplied. It is to be hoped that a closer study of our local fauna will add other species to the list and that fuller notes on habits will render a future revision still more satisfactory than the present.

AREA INCLUDED.

As in the previous list a circular area with a radius of 20 miles from the Capitol as a center is adopted. This seems to represent the original animal life of the District of Columbia better than does the area within the present restricted boundary lines of the District, much of which is now occupied by the city proper. All but a very few of the notes however refer to the inner half of this radius and most of them to the original 10 mile square formerly included within the District. The present area reaches well beyond the farthest corners of the Geological Survey quadrangle and includes many swamps, marshes, glens, cliffs, and forested areas, now not fully explored, that promise worthy discoveries. Not half and probably not a quarter of it has been carefully examined or trapped over for mammals.

¹List of Mammals of the District of Columbia, by Vernon Bailey. Proc. Biol. Soc. Washington, Vol. X, pp. 93-101, May 28, 1896.

HISTORICAL.

The early natural history of the District of Columbia, including records of mammals for the region about Washington has been well presented by W. L. McAtee, in Bulletin I., of the Biological Society in 1918, but there is still a rich field in old journals and manuscripts and in obscure publications which will eventually throw much light on the actual conditions of the animal fauna in its primitive state.

Of the mammals known formerly to occur in or near the District of Columbia, but no longer found here, may be noted the buffalo, elk, white-tailed deer, beaver, panther, wolf, marten, black bear, and the bottle-nosed dolphin, or porpoise.

The porpoise was last seen in the river near Georgetown in 1884, and was then common in the lower part of the Potomac, but has now become scarce.¹ Being more or less migratory in habits its reappearance is not improbable.

ACKNOWLEDGMENTS.

My own notes have been freely supplemented by those of other members of the Biological Survey and the Biological Society. So far as possible credit is given with each note, but for the preservation of specimens and the records that go with them it is obviously impossible to give full credit in all cases. Even a list of those who have actually contributed to the net results would include most of the local naturalists from Baird down to the present time, and include, besides mammalogists, a large number of ornithologists, entomologists, herpetologists, conchologists, botanists, and others with only the keen outdoor interest of the world in which we live.

For more than the ordinary contributions of specimens and notes, however, I wish to express my indebtedness to Dr. C. Hart Merriam, Dr. E. W. Nelson, Dr. A. K. Fisher, Dr. T. S. Palmer, Dr. Wilfred H. Osgood, Mr. Morris M. Green, Mr. Edward A. Preble, Mr. A. H. Howell, Mr. N. Hollister, Major E. A. Goldman, Mr. Gerrit S. Miller, Jr., Dr. Charles W. Richmond, and Mr. J. H. Riley.

FAUNAL POSITION.

The District of Columbia lies wholly within the Carolinian division of the Upper Austral Zone, but in a comparatively

¹The Pastime, Vol. 3, No. 2, p. 16, Aug., 1884.

narrow belt between the Austroriparian, which comes the up coast as far as Norfolk; and the Alleghanian, which follows down the mountains only a short distance to the westward. As a natural result of proximity a few Alleghanian species drift down the streams and find footholds on the cold slopes of high banks and cliffs, and in cold gulches, or in cold swamps and sphagnum bogs, where very local conditions afford more or less congenial environment. *Microsorex* from near the hemlock slopes on the west side of the Potomac above Plummer Island, and *Synaptomys* from the sphagnum swamps near Hyattsville are good examples. The red squirrel is here on the edge of its zone, which is mainly Alleghanian. The red-backed mouse (*Evotomys*) may yet be found on some of the cold slopes of the river bluffs.

On the other hand the Austroriparian rice rat (*Oryzomys palustris*) reaches up from the south with the live oaks almost to the edge of the District (to near Colonial Beach, Virginia) and will probably be added to the District list when the Patuxent marshes are explored. There is one specimen of the southern shrew (*Sorex longirostris*) recorded for the District, and the Carolina shrew *Blarina brevicauda carolinensis* comes close to the southern border. The golden mouse (*Peromyscus nuttallii*) was recorded for the District in 1861 by Haley in Philp's "Washington Described," but as no specimens are known to have been taken nearer than the Dismal Swamp, Virginia, this Austroriparian species is not included in the present list. A number of specimens of the Rafinesque bat (*Nycticeius humeralis*), which is mainly an Austroriparian species, are merely the free wanderers of a winged species near the edge of its real zone.

Class MAMMALIA: Warm-blooded animals that nurse their young.

Order MARSUPIALIA: Pouched animals.

Family DIDELPHIIDAE: Opossums, etc.

OPOSSUM, VIRGINIA OPOSSUM.

***Didelphis virginiana virginiana* Kerr,**

In size the opossum about equals the ordinary house cat. It has naked ears, long nearly naked, prehensile tail, and soft gray fur. The female has an external abdominal pouch, in which the young are carried and nursed for about 76 days after birth before they first emerge. The period of gestation is about 16 days, and the young when born are very rudimentary, about the size of small navy beans, weighing about a fifth of a gram each. An adult male measures in total length 780, tail 298, hind foot 70 mm.;

in inches, 30.7, 11.8, 2.75. A large male caught near Woodley Road in December, 1919, weighed 8 pounds.

Opossums are common about Washington, where their tracks may be seen on the muddy or sandy shores of creeks and ponds, or sometimes in fresh snow. The print of the projecting thumb on the hind foot characterizes the track, as well as the pointed nose and little eyes do the face. Mainly nocturnal and great wanderers at night they are rarely seen in the daytime unless routed out of an old burrow, a hollow log or tree, from among the rocks, or under a brush heap. They are good climbers and when chased by the dogs will go to the tops of the tallest trees. In the spring of 1894 I found one fast asleep on a large branch of a white oak near the Adams Mill Road entrance to the Zoological Park, and since then others have been found in the trees in the heart of the city where they had wandered during the night. A few are usually kept in the Zoological Park, but are too sleepy to be of much interest to diurnal visitors.

J. H. Riley tells me of a Negro who with the aid of a dog caught over seventy opossums in one fall and winter near Falls Church.

A female not yet fully grown was brought to me by Frederick Coville, in December, 1917, from a night hunt near Washington. I kept her in a box most of the winter, feeding her scraps from the table. Any kind of meat was eagerly eaten, as were vegetables, cereals, fruit, milk, and a great variety of food. In fact anything edible was rarely refused. She was perfectly tame but slow and stupid and would rather "play possum" than run away.

In the spring she was sent to the Zoological Park, and on May 21, placed in a cage with a mate. On August 28 she was found to have seventeen young, probably several weeks old, which had just emerged from the pouch. Evidently the family was too large for one small mother to raise, nine to eleven being the usual number, and seven of these died. Thirteen and fourteen were the highest previous records I had known, but J. H. Riley reports a large female captured by a neighbor near Falls Church, which was said to have seventeen young. Riley himself found a female in a hollow log late in April, with nine very small young in the pouch, each fastened to a nipple.

During the winter fat opossums are temptingly displayed in Center Market, where usually offered at the moderate prices of 50 cents to \$1.50 each. When scalded and the hair removed they much resemble fat pigs and by many are considered a great delicacy. They are tender and of good flavor, but usually very rich and oily. Their light gray fur is long and soft, and when in prime condition is so attractive that in recent years it has been much worn as capes, collars, and muffs.

Order GLIRES: Gnawers.

Family SCIURIDAE: Squirrels, chipmunks, woodchucks, etc.

RED SQUIRREL.

Sciurus hudsonicus loquax Bangs.

These are the smallest of our tree squirrels, about half the size of the gray squirrels. Their upperparts are bright reddish brown, brightest in winter

and with a black stripe along each side in summer, and the lower parts are mainly white. Adults measure in total length about 340, tail 137, hind foot 50 mm.; in inches 13.4, 5.4, 2.

From 1902 to 1906 red squirrels were common in the woods of the Zoological Park and about Washington, but in recent years they have become very scarce and are rarely seen near the city, though in 1918 Dr. Dearborn told me they were common near his place at Linden, Maryland, between the District line and Takoma Park, and Riley reports them still so common near Falls Church as to be something of a nuisance among cultivated nuts. Specimens in the U. S. National Museum were collected near Washington in 1886, by Dr. C. Hart Merriam; in 1888 by M. M. Green; in 1889 by Dr. A. K. Fisher; in 1896 by Vernon Bailey; at Laurel, Maryland, in 1886 by George Marshall; at Baileys Crossroads, Virginia, in 1888 by E. M. Hasbrouck; at Falls Church, Virginia, in 1896 by C. G. Rorebeck, and in 1897 by James H. Gaut; at Four Mile Run, Virginia, in 1897 by W. H. Osgood; at Marshall Hall, Maryland, in 1899 by Dr. Sylvester D. Judd, and at Plummer Island, Maryland, in 1908 by H. S. Barber. The same year Dr. A. K. Fisher reported one seen swimming across the Potomac near Plummer Island, and in 1914 another living near the cabin until caught and eaten by a Cooper hawk. He also reported them on the island in 1919 and 1920. In December, 1906, W. L. McAtee saw one feeding on seeds of the tulip tree in Rock Creek Park. Some years ago they were common in the Soldiers Home grounds, and Preble tells me they were formerly common at Marshall Hall, and that one or two lived in a pine grove near Wisconsin Avenue and Fulton Street in 1919. I have seen a few in Rock Creek Park, near the Bureau of Standards, near Hyattsville, and in the woods west of the Potomac River, and occasionally have heard their cheery *ch-r-r-r-r-r-r-r* where they were not seen.

Their bulky nests of grass, moss, and cedar bark fibers are sometimes seen in the branches of trees and usually can be distinguished from the gray squirrel nests by their smaller size and finer material, and from flying squirrel nests by larger size and coarser material. They also make their nests in the hollows of trees.

Nuts and acorns generally furnish these squirrels an abundance of food but they have a wider range of diet than the gray squirrels and eat many seeds, berries, and mushrooms.

They are beautiful and attractive little squirrels, and their decrease in abundance would be more regrettable but for the fact that they are known occasionally to rob the nests of birds.

CAROLINA GRAY SQUIRREL.

Sciurus carolinensis carolinensis Gmelin.

The native gray squirrels are about twice as large as red squirrels, and a little more than half as large as fox squirrels. Their tails are large and puffy, the upperparts clear brownish gray and the lowerparts white. Total length 480, tail 220, hind foot 66 mm.; in inches 18.9, 8.7, 2.6. An old female that came to my windowsill for peanuts and sat on the scales to eat

them weighed 1 pound and 7 ounces. Another female weighed 1 pound, 8 ounces.

From the beginning of my own observations in the District in 1891 gray squirrels were common in the woods around Washington up to the edges of the city. They were frequently seen at the edges of Washington Heights, and on the hill around the old house since used as an office for the Zoological Park, and throughout the extensive areas of the Zoological, Rock Creek, and Woodley parks, the Soldiers Home, Marshall Hall, and Mount Vernon. They were also found in the extensive woods along both sides of the Potomac River above Georgetown, but in unprotected woods were exceedingly shy and rarely seen. The extensive areas of native forest with old hollow walnut, butternut, hickory, chestnut, beech, and oak trees afforded safe retreats and an abundance of choice food for the squirrels which lived in their hollows or built bulky nests of sticks and leaves in their branches.

In 1894 E. A. Preble saw one in the Smithsonian grounds, but whether this was an escaped pet or a wanderer from the suburban parks was not known. Later several lots of squirrels were released in the parks. The late Dr. Wm. L. Ralph purchased many gray squirrels and liberated them in the Smithsonian grounds, where up to the time of his death in 1907, he fed and cared for them in both fair and stormy weather with keen interest and enjoyment, as recorded by Dr. A. K. Fisher in his biography. They soon became common in the Mall, in the fine old forest then stretching from the Capitol grounds to the Monument, and spread to the White House grounds, LaFayette Square, and other city parks. In 1900 they were a common feature of the parks, and were occasionally seen along the tree-lined streets in town. Since hunting with guns and dogs was first prohibited in the District (in 1906), the squirrels have not only increased in numbers, but become comparatively tame in the woods as well as in the city parks.

In 1909 an old squirrel took up her residence in a bird house in the hickory tree in my back yard at 1834 Kalorama Road, and on the 28th of the following February she had 4 young in the nest. They were not seen out of the box until April 2 when nearly half grown squirrels. They were soon able to take care of themselves and were apparently weaned about May 20. This was the earliest litter noted, but others have been born early in March. Young have been raised in my yard every year since, and often an old squirrel raises a second litter of young which appear out of the nest in September or October. Four is the regular number of young, but there have been two litters of five.

Alley cats catch some of the young squirrels and occasionally an old one, but for over twenty years I have managed to keep one or two families of squirrels around the place to the great delight of the neighborhood children and to our own constant enjoyment.

In the parks the squirrels are a continual source of interest and pleasure to thousands of children and invalids, as well as to the general public who hurry by with a look, a word, or a peanut for greeting. During snowy weather the squirrels are sometimes fed by the District police, and with nuts and acorns from the trees and peanuts from passersby they generally

fare well. In dry weather, however, they often have to go a long distance for water as they are thirsty animals, requiring water at least once a day and drinking several times a day if a supply is available. Often they are obliged to leave a locality where water is not to be had.

At times, especially in spring, they are greatly pestered by fleas and mites. If noticed scratching or if they show rough and patchy coats, a teaspoonful of good flea powder (pyrethrum) mixed with a teaspoonful of powdered sulphur, thrown into their nests, will usually destroy both pests. The squirrels sometimes cause annoyance by digging up the freshly planted bulbs in our yards in winter, but will rarely disturb them when set down five inches below the surface of the ground where they are also safe from too early sprouting.

The psychological value of a defenseless wild animal in our midst to be protected, fed and guarded by the people through interest rather than by force of law, can not be overestimated.

BLACK SQUIRREL; NORTHERN GRAY SQUIRREL.

Sciurus carolinensis leucotis (Gapper).

The northern squirrels are slightly larger than the Carolina. Their upperparts are clear light gray in winter, and brownish gray in summer in the gray phase, but they are more or less dichromatic, in some localities a few and in others half or nearly all of the individuals being black all over. Measurements, total length 500, tail 220, hind foot 70 mm.; in inches, 19.7, 8.6, 2.7.

Black individuals of these squirrels have been introduced and liberated in the National Zoological Park and evidently are increasing, spreading, and breeding true to color. Mr. N. Hollister, Superintendent of the Park, on March 11, 1919, contributed the following note:

Two shipments of black squirrels have been received from Ontario and liberated in the Park. The first shipment of ten was from Rondeau Provincial Park, Morpeth, Ontario, May 18, 1906; and these squirrels were immediately liberated in the northwestern part of the Zoo where they were very much at home. They have since been constantly in the Park, especially from the vicinity of the great flight cage to the Klinge Valley, and they have spread northward to Cleveland Park and nearly to Chevy Chase. During the winter of 1919 two appeared near the Park office and they are now frequently seen in the vicinity.

FOX SQUIRREL.

Sciurus niger neglectus (Gray).

The fox squirrels are the largest of our squirrels, being nearly twice as heavy as the gray, with rich buffy or orange lowerparts, and buffy or yellowish gray upperparts, with crown and nose often blackish. Total length 598, tail 289, hind foot 78 mm.; in inches 23.5, 11.4, 3.1.

Fox squirrels are now rare in the vicinity of Washington, but apparently not entirely exterminated. In 1905 I saw one on the Virginia side of the Potomac just above Plummer Island; on October 22, 1916, Francis Harper

saw one just above Great Falls on the Maryland side of the river; and in September, 1919, J. H. Riley reported one killed about 3 miles south of Falls Church. There are specimens in the U. S. National Museum from Maryland, taken at Laurel, Patuxent River at Priest Bridge, and North Chesapeake Beach, and from Virginia at Accotink, Hampstead, Clark County, and at Blumegrove, Bluemont, Osso, and Hightown.

The squirrels brought into Center Market for sale every winter are said to come from Virginia, but no definite locality can be assigned to them by the dealers. They probably come from the foothills and mountains considerably west of Washington. In 1861 Haley in Philp's "Washington Described" says (p. 23), "The most interesting species is the cat squirrel (*Sciurus cinereus*), a very large, heavy kind occurring in different varieties of color, as red, gray, and black. It is confined to a limited area in Virginia, Maryland, Pennsylvania, Delaware, and New Jersey."

Highly prized game animals, these large and handsome squirrels have been persistently hunted until on the verge of extermination over much of their original range. But for their great intelligence and skill in hiding and keeping out of sight they would long since have vanished from our remnants of forest. If as vigorously protected as they have been persecuted they would soon increase and again we should see their long plummy leaps through the trees and hear their husky barking in our too-silent forests. They are superb squirrels, in size and beauty far surpassing the grays and just as easily tamed. In Ann Arbor, Detroit, Madison, and other cities they are as common and tame in the city parks and streets as our gray squirrels are here.

Fox squirrels, some of which may be of southern forms, have been liberated at various times in the Zoological Park and have been observed from time to time during the past few years in Cleveland Park and adjoining wooded sections. Mr. N. Hollister, superintendent of the Park, reports importations of seven from Wichita, Kansas, in 1899; of one from South Carolina, in 1902; of eight from Arion, Iowa, in 1903; of one from Richmond, Virginia, in 1904; and one from Columbia, Tennessee, in 1916.

CHIPMUNK.

Tamias striatus striatus (Linnaeus).

Chipmunks are considerably smaller than the red squirrels, with slender tails and shorter legs. The five black and two white or buffy stripes on the rusty brown back distinguish them from any other eastern mammal. An adult measures in total length 233, tail 88, hind foot 35 mm.; in inches 7.2, 3.5, 1.4.

These little striped ground squirrels are fairly common in many of the patches of woods around Washington, up to the very edge of the city, where cats are not too numerous. They are occasionally seen running over the ground and over logs or rocks, or even up the trunks of trees, for they are good climbers. They live in hollow trees, logs, or holes in the ground where they build soft nests and lay up stores of nuts, seeds, and grain for winter use, filling their capacious cheek pouches and emptying them in the storage

chambers near their nests. They also become well covered with fat in the autumn, and during the cold weather of winter hibernate for a long or short period according to the weather. Farther north they hibernate for about five months, but here they may be seen out of their dens at any time of winter during a period of warm weather. They are generally sleepy and quiet until their breeding season begins in March or April.

Late in summer and in autumn their rapid chipper of alarm is most often heard and occasionally also the slow *chuck, chuck, chuck*, of their call note.

They feed on a great variety of nuts, acorns, seeds, berries, insects, lizards, and such small game as they can catch. As pets they will eat a great variety of scraps from the table and are gentle and full of bright interesting ways.

SOUTHERN WOODCHUCK; GROUND HOG.

Marmota monax monax (Linnaeus).

The woodchuck is a heavy, short-legged animal with short ears and short bushy tail, in color grayish brown above and rusty below, with blackish tail and feet. When full grown it will measure in total length about 665, tail 153, hind foot 88 mm.; in inches 26, 6, 3.5, and weigh about 10 or 12 pounds.

Woodchucks are common on the bluffs on both sides of the Potomac River above Chain Bridge, and on High Island, Plummer Island, Scott Island, Cupids Bower, and other islands in the river. Riley reports a very few at Falls Church and they occur in some numbers in the farming country between there and the Potomac, as well as in other locations around the District. Hollister reports one seen in the Zoological Park in 1919. The abundance of rocks along the river bluffs afford them unusually safe retreats in which to escape dogs and other enemies. On Plummer Island where no dogs are allowed, a few woodchucks became quite tame and come out on the rocks close to the cabin where the club members can watch them feeding or sitting in the sunshine. They generally select rocky slopes, or steep hill-sides for their dens and burrows, but also make large and conspicuous burrows on level ground, in the woods, or occasionally out in fields. Their trails and burrows may often be found, but usually the animals are very shy and keep out of sight when people are around. Their loud whistle is sometimes heard from a considerable distance, and it is generally a warning note to others of the family that danger is approaching.

Woodchucks feed mainly on green vegetation, and are especially fond of clover and most farm crops, so it is necessary to keep their numbers well reduced in farming districts. In woods and wild land they do no harm and add much of interest to the quiet places.

In autumn they become very fat and during the coldest part of winter hibernate deep down in their burrows. In this climate they may come out on warm days in winter, but farther north they hibernate securely for about five or six months.

On March 26, 1917, Prof. D. E. Lantz noted thirty-eight woodchucks displayed in Center Market for food. Three days later thirty-six of them

had been sold for a dollar a piece. By many they are highly prized as game animals.

Family PETAURISTIDAE: Flying squirrels.

FLYING SQUIRREL.

Glaucomys volans volans (Linnaeus).

The small flying squirrels of the Eastern States are scarcely as large as chipmunks, but when spread on their two broad membranes into a nearly square, flat gliding plane, steered by the wide, horizontally flattened tail, they look much larger than they really are. They have large black eyes, short ears, soft silky fur of a drab gray on the upperparts and creamy white below. Adults measure in total length 232; tail 101, hind foot 30 mm.; in inches, about 9.1, 4, 1.2.

In the woods around Washington up to the very edges of the city they are fairly common, although rarely seen on account of their strictly nocturnal habits. In 1888 and 1889 Morris M. Green found several pairs living in woodpecker holes in trees along Rock Creek, in the Soldiers Home Grounds, and along Eastern Branch. One day in 1893 Preble and Hasbrouck found at least fifteen in woodpecker holes in two dead oak stubs near Mount Vernon, discovering them by pounding on the trees in which they lived. One got into a trap I had set for a wood rat at the west end of Chain Bridge, and I have often made them fly from a hollow tree just below the Connecticut Avenue Bridge, and in many places in Rock Creek Park. At Falls Church Riley reported finding twelve living in hollows in one tree, and one that he saw sail to a tree 90 feet from its starting point. Generally they live in hollow trees or old woodpecker nest holes, but in 1902, when trapping with Theodore Roosevelt, Jr., we found several of their nests in the dense evergreen tops of red cedar trees along Broad Branch where we could go at any time and tap on the trees and see the squirrels come out and fly away to the nearest trees. The nests were neat balls of finely shredded cedar bark with round holes at one side like marsh wrens' nests. On April 12, 1917, at our Boy Scout camp on the Virginia side of the river just above Plummer Island, E. A. Preble and Francis Harper found a family of young flying squirrels in a bark nest in the fork of a tree at the edge of camp. The young were examined very gently, but the following morning the old squirrel had removed them to safer quarters. A family of 6 young reported by Prof. Lantz at Silver Spring, Maryland, left their nest about July 20, 1917. On Plummer Island in 1906 Dr. Fisher had five of his seventeen gourds, hung on trees on the island, occupied by flying squirrels, and on May 17, 1908, an old female was nursing her young in one of the gourds not far from the cabin. In the sixth story of the Ontario Apartments Mr. Henshaw for several winters has fed flying squirrels on his windowsill at night. They would come up the stucco walls and enter his room if the window was open, sometimes burying nuts under his sofa cushions and behind his books.

In the still woods at night one often hears their fine shrill squeak or whistle, and occasionally a soft little *pat* as one alights on the side of a tree,

but for such common animals they are little noticed. They may be found in the daytime by pounding with a hatchet on the base of an old tree that contains a hollow or an old woodpecker hole and watching to see if a little round head and black eyes appear at the door. If one does appear more vigorous pounding will generally send it off on wide spread membranes to the next tree and often to the next and the next. They are often caught by boys and tamed, and if taken young make delightfully gentle and interesting pets. The only trouble is they want to sleep all day and play all night.

Family MURIDAE: Rats, mice, etc.

NORWAY RAT.

Rattus norvegicus (Erleben).

The common Norway, brown, wharf, or house rats with their pointed noses, small eyes and ears, nearly naked tails, and coarse brown fur are the embodiment of all that is offensive in the rodent family. Large individuals will measure in total length 415, tail 192, hind foot 43 mm.; in inches 16.3, 7.5, 1.7, and weigh about a pound, rarely two pounds. Usually quarter or half grown individuals are seen, as fortunately few ever reach extreme old age.

Natives of the Old World these rats came to America in ships about 1775, and have spread over a large part of the continent. They are numerous throughout Washington and the District of Columbia, not only in dwellings, stables, storehouses, markets, along the wharves, in the alleys and back yards where cover and food can be found, but in parks, fields, and gardens, and especially around dump heaps and trash deposits. In places they swarm on the river flats burrowing in dikes and banks, in dry weather living in the flat ground or among rocks or under cover of dense vegetation, brush, or logs.

They eat almost anything that is edible and unlike most small mammals seem indifferent about cleanliness or sanitation. They run through mud and sewage and swim across streams and are often filthy and covered with sores and with the fleas that convey bubonic plague to human beings. They breed rapidly, beginning when half grown and producing 6 or 8 to 12 or 13 young at frequent intervals throughout the year. They cause great loss of property, are a menace to health and should be destroyed at every opportunity.¹ Owls are their greatest enemies and should be carefully protected. Dr. Fisher has taken 434 rat skulls from barn owl pellets found in the Smithsonian towers.

BLACK RAT.

Rattus rattus rattus (Linnaeus).

The black rat is smaller and slenderer than the brown rat, with much longer, slenderer tail, larger ears and eyes, and generally of a dull or plumbeous black color all over. A medium sized adult measures in total length 397, tail 223, foot 36, and ear (dry) 20 mm.; in inches approximately 15.6, 8.8, 1.4, .8.

¹See Bull. No. 33, Biological Survey, U. S. Dept. of Agr. Also more recent circulars.

These rats are native in the islands of the western Pacific but have been carried in ships to ports all over the world. They were brought to America before the brown rats were known here, and at one time were the common rat of the Eastern States, but have gradually disappeared before the larger species, except along the shores or near shipping ports. Two specimens were taken in Center Market in January and February, 1912, supposed to have been brought in boxes of dates from Egypt. Another, apparently of this species, was taken alive April 20, 1923, on a river boat at the Seventh Street wharf, and others may be expected at any time along the Potomac water front.

ROOF RAT.

Rattus rattus alexandrinus (Geoffroy).

The roof rat is very similar in proportions and general characters to the black rat, but is usually grayish brown above and white below. A fair sized individual measures in total length 435, tail 230, foot 37, and ear (dry) 21 mm.; in inches approximately 17, 9, 1.4, .8.

Native in the more southern islands of the western Pacific these rats have been carried in ships over much of the world. They rarely penetrate to a great distance from the coast and seem never to have been recorded from the vicinity of Washington until very recently when several were taken alive, in April, 1923, on one of the river freight boats at the Seventh Street wharf. They are evidently kept away from the cities and settlements by the larger and fiercer brown rats, but are occasionally found in the Southern States in the woods and along streams, where they climb trees and vines and make their nests when possible well above the ground and out of the reach of numerous enemies.

HOUSE MOUSE.

Mus musculus musculus Linnaeus.

The common house mouse, with its sharp nose, small eyes, long, tapering tail, and mouse gray or mouse brown fur and rank mousey odor is too well known to most people. An adult specimen measures in total length 160, tail 80, hind foot 19 mm.; in inches 6.3, 3.1, .75; and weighs about 20 grams.

There is no record of their first introduction from the Old World to America, but it may have been in the Mayflower. They are now almost all over the settled parts of the continent, and are usually most numerous in the cities, and in and around buildings, but in many places have become established in fields and waste places. In Washington they are numerous about buildings, in the alleys, under rubbish or any cover in back yards or vacant lots, in lumber piles, wood piles, and especially in weed patches or tall grass in parks or waste places. Potomac Park and the flats along the river and creeks were swarming with them before they were cleared and kept mowed and clean. They are found on almost every farm, not only in buildings, but in the fields and along fence rows from which they enter the grain fields and shocks and stacks.

As their name indicates, they prefer to live indoors, in basements and cellars and attics, between walls, floors, and ceilings of houses, or in store-rooms, barns or granaries, where they occasion much annoyance and loss of property. They crowd into buildings during the first cold weather of winter, seeking protection, warmth and food. A few mouse traps well baited with rolled oats, bread, or bacon, or better with all three, will usually keep them caught out of any building. Dr. Richmond, a bird lover, who does not keep cats, finds that by trapping the mice thoroughly at the beginning of winter he has little trouble for the rest of the year. Dr. Fisher has taken 817 skulls from the pellets regurgitated by barn owls which formerly inhabited the towers of the Smithsonian building.

WHITE-FOOTED MOUSE.

Peromyscus leucopus noveboracensis (Fischer).

The white-footed mouse, woods mouse, or deer mouse, is about the size of the house mouse, but with larger eyes and ears, softer fur, and much brighter, prettier expression. The upperparts are buffy brown, and the feet and lowerparts and lower half of the tail pure white. The young are slaty gray. Adults measure in total length approximately 175, tail 73, hind foot 20 mm.; in inches 6.9, 2.8, .75. Weight about 20 to 24 grams.

These bright little native mice are common in the woods up to the very edges of Washington, but are nocturnal and rarely seen except by naturalists and boys who take enough interest in the wild creatures around them to want to make their acquaintance. They are found in hollow trees or logs, or in walls, banks, or rock piles where they make soft nests in well hidden cavities from which they come out at night and gather seeds or grain and nuts for food. They climb trees and are as active, bright, and pretty as squirrels. Only rarely do they enter buildings, or do any serious mischief unless in grain fields, where they help themselves to a small amount of grain or dig up some of the planted seeds.

They are too quick and nervous for good pets, but are extremely interesting in captivity, and very fond of spinning their hollow wheels or revolving disks at night.

WOOD RAT.

Neotoma pennsylvanica Stone.

These native rats differ greatly in both appearance and habits from the house rats, although about the same size. They have large ears and eyes, very long mustaches, round hairy tails, and soft fur. The upperparts are buffy gray, lowerparts and feet pure white. An adult specimen measures in total length 388, tail 172, hind foot 42 mm.; in inches 15.2, 6.7, 1.6.

Wood rats are common in cliffs, caves, and rock slides along the west side of the Potomac River from Chain Bridge to Great Falls, but no trace of them has been found on the east side of the river, even in the most ideal situations, and only recently have they appeared on Plummer Island. They live among the rocks and in places block the doorways of their little caves and clefts with sticks, chips, and bark and such other building material as they can find and carry. Scattered remains of food plants, nut

and acorn shells, and sometimes dry or freshly cut green plants mark the entrances of their dens and their long black pellets scattered about near by are unmistakable evidence of their presence. They are mainly nocturnal but I have seen them running among the rocks when disturbed in the daytime. They have a musky odor but the flesh is white and delicate and better than that of squirrel or rabbit.

The two to four young are raised in soft nests among the rocks.

VIRGINIA MUSKRAT.

Fiber zibethicus macrodon Merriam.

Musk rats with their thin, naked, flattened, rudder tails, large webbed hind feet, short ears, and coats of dense soft fur are fitted for a life passed mainly in the water. In color they vary from a golden brown to dark brown and black, with paler lowerparts. Adults measure in average total length 620, tail 274, hind foot 88 mm.; in inches 24.5, 10.7, 3.4.

Musk rats are common in all suitable localities about Washington, in the marshes on both sides of the Potomac, as well as in Rock Creek and many other small tributary streams. E. A. Preble tells me they used to be common in natural ponds on the Potomac Flats near the present site of the Lincoln Memorial. Hollister in his "Synopsis of the Muskrats" lists specimens from Washington, Kensington, Forest Glen, Branchville, Laurel, Broadwater, and Arlington. They have been seen in broad daylight in the Zoological Park swimming in Rock Creek. In the marshes along both sides of Anacostia River muskrat houses are common and a few are usually seen from the railroad in the ponds and marshes just west of the bridge across the Potomac. The creek banks are in many places perforated by their burrows as along the streams muskrats generally live in bank dens rather than houses.

Large numbers of skins are brought to the market by local trappers from the big marshes farther down the river, and during the open season muskrat meat is one of the standard articles of game in Center Market where it is usually sold under the name of "marsh rabbit." The meat is dark but of very good flavor and quite free from the musky odor that is often noticeable on the skins.

MEADOW MOUSE; FIELD MOUSE.

Microtus pennsylvanicus pennsylvanicus (Ord).

These are heavy bodied, short eared, short tailed, short legged little field mice with small beady eyes and long soft, dark brown or blackish fur. They measure in total length about 171, tail 46, hind foot 21 or 22 mm.; in inches 6.7, 1.8, .76; and weigh from 35 to 45 grams, rarely 56 grams.

They are probably the most abundant native mammals all around and up to the very edges of Washington, and even press into the city and have been taken in the city parks and on vacant lots. They fairly swarmed over the river flats and marshes, including Potomac Park, until the ground was cleared of weeds and wild grass, and seeded down and kept mowed and clean. Up to 1919 many places in Potomac Park were honeycombed with

their burrows and runways. Soft clean nests are made of fine grass and leaves, either underground or on the surface, where the young are born and raised, and where much of their time is spent. From the burrows they make little roads or runways over the surface of the ground, under grass or weeds, or the cover of vegetation, and along these runways are strewn fragments of cut grass and plant stems from remains left from their food. They feed mainly on green vegetation, roots, and bark, but are also fond of seeds and grain and do considerable mischief in fields and orchards. They breed rapidly, producing four to eight young at a time at frequent intervals throughout the year, and if protected from their natural enemies increase at an astonishing rate. Owls and many hawks feed on them extensively and keep their numbers within bounds, without which no crops could be raised. From the barn owl pellets in the Smithsonian towers Dr. Fisher has taken the skulls of 3,730 meadow mice.

PINE MOUSE.

Microtus pinetorum scalopsoides (Audubon and Bachman).

These little brown mice are smaller than the meadow mice with relatively shorter ears, tails, feet, and fur. The fur is more velvety in texture and the color is a dull chestnut brown above and buffy brown below. They measure in total length about 125, tail 20, hind foot 16 or 17 mm., in inches 4.9, .75, .60.

They are found all through the woods and fields and uplands around Washington up to the edges of the city and are often associated with the pine timber on dry, sandy ridges. They are by no means restricted to pine timber however, and may be found almost anywhere except on low, wet ground. They live in burrows that often take the form of ridges, the ground being pushed up from just below the surface in long ridges that may be traced for rods over mellow soil. These are usually not so high or large nor the tunnels so large as those of moles, but in many cases the mice use the mole runways. They also make surface runways under cover of leaves, grass, and weeds, and in the covered runs safely penetrate fields, gardens, and open ground.

Pine mice live extensively on roots, tubers, bulbs, and the bark from roots and stems of many plants, including trees and shrubs. In orchards and yards they are especially mischievous, killing many fruit trees and flowering or ornamental shrubs, often taking all the bulbs from flower beds and destroying garden vegetables. They store bulbs and seeds in the burrows and at Falls Church, Virginia, J. H. Riley has found where they had stored seeds of the persimmon in underground cavities. They are among the most destructive of the native rodents in the Eastern States, and are so protected by their burrowing habits from their natural enemies that it becomes necessary to poison them for the protection of trees and crops.¹ Their comparative immunity from predacious birds may be judged by the fact that only 73 of their skulls were found by Dr. Fisher in the barn owl pellets in the Smithsonian towers.

¹See Farmers' Bull. No. 670, Field Mice as Farm and Orchard Pests, by David E. Lantz, U. S. Department of Agriculture. Also later circulars.

Their destruction by snakes and shrews which can readily enter their burrows and capture the occupants is probably greater than that by overhead enemies.

COOPER LEMMING MOUSE.

Synaptomys cooperi cooperi Baird.

The Cooper lemming mice resemble meadow mice in general appearance but have grooved upper incisors and very short tails, and are more grayish in color. The upperparts are grayish brown, lowerparts buffy gray or whitish. An adult male measures in total length 130, tail 19, hind foot 20 mm.; in inches 5.1, .75, .75.

In 1888 Dr. A. K. Fisher examined some pellets of long-eared owls from Munson Hill, Virginia, and among 176 skulls of small mammals found three of this lemming mouse. Another skull was found in the stomach of a red-tailed hawk killed at Sandy Springs, Maryland, March 24, 1890. In 1896, I set a line of traps through a sphagnum swamp near Hyattsville, Maryland, and caught four of these rare mice, and the following year W. H. Osgood and A. H. Howell took specimens in the same swamp, while in 1899, Gerrit S. Miller, Jr., took three specimens $2\frac{1}{2}$ miles west of Beltsville, Maryland. In this part of their range they take advantage of the coolness retained in the sphagnum swamps. At Hyattsville I found their runways common through the cool damp sphagnum moss, which keeps all below it cool and often protects the ice underneath from melting until long after the rest of the winter's ice has vanished. In this swamp the mice were able to live in comfort, as shown by their runways, nests of grass, and cut stems of grass along their runways. The Hyattsville swamp has since been drained and filled up but many others remain where these mice may be looked for.

SMALL EARED HARVEST MOUSE.

Reithrodontomys humilis impiger Bangs.

Harvest mice are slender little animals with rather small ears and long tails. They most resemble the white-footed mice but are smaller and slenderer with deeply grooved upper incisors. From half grown house mice, which they most resemble, they differ in slender tails that do not taper appreciably. Their upperparts are russet brown, lowerparts buffy gray. Adults measure in total length about 125, tail 61, hind foot 16 mm.; in inches 4.9, 2.4, .60.

The little harvest mouse was first taken at Fort Myer on December 6, 1896, by Louis di Zerega Mearns. Another was taken at Falls Church, May 7, 1897, by J. H. Riley, and on May 15, 1902, about a mile south of Alexandria a third was taken in a line of traps which I was showing Theodore Roosevelt, Jr., how to set for small mammals.

One skull was found by Wetmore in a barn owl pellet from the Smithsonian tower in 1916, and two more in 1917, while in 1920 Dr. Fisher reports a total of 15 skulls from the pellets of these owls. These are the only records so far for the vicinity of Washington, and the only others are from the type locality, at White Sulphur Springs, West Virginia. Apparently it is not a common species anywhere. The one from Fort Myer was taken

in a trap set under a fence between a cultivated field and a strip of woodland. The one from near Alexandria was caught in an out-of-sight trap baited with rolled oats in a little runway in the grass on the edge of a dry meadow. The one from Falls Church was taken in a trap set in a pine mouse runway.

In habits they are somewhat like the field mice, living in open country under cover of grass, weeds, and grain, making little runways over the surface of the ground and probably building neat little nests on or above the surface in weeds or bushes as do other closely related species. So little is known of their distribution and habits that they offer a most attractive subject of study for ambitious young naturalists.

Family ZAPODIDAE: Jumping mice.

CAROLINA JUMPING MOUSE.

Zapus hudsonicus americanus (Barton).

In size about like the white-footed mouse but with grooved upper incisors, very long hind legs and feet, long slender, nearly naked tails, and rather small ears. In color they are dull yellowish brown along the back, bright orange buff along the sides, and creamy white below. One caught at Chevy Chase measured in total length 202, tail 121, hind foot 29; in inches 8, 4.75, 1.1. Weight of female 19.2 grams on July 26; 41 grams when fat on November 26.

In 1861 Washington was given as the southern limit of range of this mouse in Philp's "Washington Described" (p. 23). In 1886 George Marshall collected 3 specimens for Dr. Merriam at Laurel, Maryland, and the same year Dr. Merriam caught one in his hands on the Virginia side of the river just above the west end of Aqueduct Bridge. Henshaw collected one the same year that is labeled "Washington." In 1888 Morris M. Green caught several at a point a quarter of a mile below the west end of the Old Long Bridge. They were caught in his hands in the daytime in the weeds around brush heaps about fifty yards back from the river. In 1896 Rorebeck collected one at Falls Church, Virginia; in 1899 Geo. R. Bryan collected one at Marshall Hall, Maryland; in 1903 Kenneth Beale collected one at Branchville, Maryland; in 1906 Dr. Fisher took one at Sandy Springs, Maryland; in 1909 I caught one near Chevy Chase; and in 1913 Dr. E. W. Nelson took one near Cabin John Bridge. J. H. Riley found one in a barn owl's nest, April 1, 1917, at Falls Church. E. A. Preble has collected two, one at Chevy Chase, D. C., and one near the Bureau of Standards, August 4, 1920, and A. H. Hardisty, one on the canal at the District line in 1921. Dr. Fisher reports fifty skulls taken from barn owl pellets from the towers of the Smithsonian.

Apparently jumping mice are well distributed over the surrounding country but are never numerous or even common. They keep in grassy or weedy places, in open country, but leave no runways or signs except little heaps of cut grass stems 2 or 3 inches long, and their grassy nest balls on the surface of the ground. While mainly nocturnal they are occasionally startled from their nests and go bounding through the grass in long frog-like leaps, then stop and sit quietly unless followed up.

If carefully approached they can be easily caught in the hands, and are very gentle and quiet if carefully held. They feed largely on seeds of grasses, cutting and drawing down the stems until the heads are reached. In autumn they become very fat and hibernate for the winter. One brought to the Biological Survey in December, 1899, was in the torpid stage of its winter's sleep, but evidently was not kept at the right temperature, for it died before waking up.

Specimens taken on October 7, 10, and 25, and as late as November 2 and others as early as April 23 indicate a longer period of activity than is enjoyed by more northern species.

A female taken by Dr. Fisher at Sandy Springs, Maryland, May 19, 1906, contained six large fetuses.

Order LAGOMORPHA: Rabbits and Rabbitlike animals.

Family LEPORIDAE: Rabbits and hares.

EASTERN COTTONTAIL.

Sylvilagus floridanus mallurus (Thomas).

The dark rusty gray fur, medium long ears, and short puffy, curled up cottony tail are familiar to all who go into the country about Washington. An adult cottontail will measure in total length approximately 446; tail 65; hind foot 94; ear 59 mm.; in inches 17.5, 2.5, 3.7, 2.3.

Cottontails are abundant about Washington, up to the edge of the city, even coming into the vacant lots and city parks. About February, 1904, one came under one of the windows of the Biological Survey in the red brick building now occupied by the Bureau of Entomology. After nibbling the grass and weeds for awhile, it snuggled down into a nestlike hollow of a grass plat and remained while Howell got his camera and took an excellent picture of it at about a 6-foot focus.

In spite of constant persecution by boys and dogs by day and cats by night the cottontails hold their own surprisingly well and may be seen by the roadsides or in walking across the grassy fields and untrimmed wood lots as well as in all the surrounding woods and parks. They were still found in 1919 in Potomac Park before the brush and weed patches had been cleared out near the lower point. They are skillful in hiding and dodging and taking advantage of safe retreats under brush-heaps, logs, stumps, or in rock piles and walls, but usually they do not get far from some safe cover.

Great numbers are brought into the markets, and at the old price of 25 cents each, they were cheap and excellent game. During the war, in 1918 and 1919, with the advance in price of other meats, they went up to 75 cents, and came into market in numbers greater than ever before.¹

¹NEW ENGLAND COTTONTAIL.

Sylvilagus transitionalis (Bangs).

These large, short eared cottontails with black crown patch and very coarse rusty brown and black fur over the back are readily distinguished from the common eastern cottontails by skull characters, but only vaguely by the darker rusty and more blackish upperparts.

They have been recorded from the District (North American Fauna No. 29, p. 199, 1909) and from Alexandria, but the record based on two young taken in a nest in the

Order CARNIVORA: Flesh eaters.

Family FELIDAE: Cats.

HOUSE CAT.

Felis domestica Gmelin.

Variable in size, form, and color, and probably derived from several ancestors, some of which date back at least to early Egypt. A large individual will weigh about 10 pounds.

The common house cats, introduced from the Old World countries, turned into the alleys at night to forage from garbage cans, then to wander to the woods, and fields, have become common and feral in all sheltered places throughout the District. Supposedly mousers, they much prefer birds and prey heavily upon many of the native species, especially the ground dwelling sparrows and low nesting robins, catbirds, thrushes, and even quail and woodcock. I have never known one to catch an English sparrow, but on several occasions when a song sparrow has taken up its residence in our back yard, a few mornings later the feathers have been found scattered on the ground. On several occasions I have found cats eating my gray squirrels in the back yard, in spite of cat proof fences and all efforts to protect the squirrels and birds. Except as kept within bounds as house pets cats quickly revert to most destructive predatory animals, and at present are a great check on the abundance of small game in this part of the country.

EASTERN BOBCAT; WILD CAT.

Lynx ruffus ruffus (Gueldenstaedt).

These large, short-tailed, spotted, dark-gray cats with tasseled ears and crested cheeks are about twice the size and weight of the house cat. An adult male from Virginia measures in total length 889, tail 153, hind foot 172 mm.; in inches 35, 6, 6.75. A female 712, 140, 165; in inches 28, 5.5, 6.5.

A. H. Hardisty tells me that two bobcats were caught near the Patuxent River near Upper Marlboro in the winter of 1918-19, and another was seen near there in September, 1919. This brings their present range barely within the twenty mile radius, but it is not improbable that they come nearer to the Capitol. They were recently and probably are still common in the Dismal Swamp and along the Alleghany Mountains in Virginia, and they have been reported from the Blue Ridge country still nearer. In 1775 they were reported here by Andrew Burnaby.¹

Soldiers Home grounds by Dr. C. W. Richmond on June 20, 1886, was erroneously included under this species, and a specimen which I bought on January 1, 1904, of a colored man on the street, who said he killed it at Alexandria, probably came from West Virginia where they are common and are often included in shipments of rabbits to market. At that time I did not know that men posing as hunters went about the streets selling game from the market stalls and, recognizing an interesting specimen, I saved it and innocently labeled it as coming from Alexandria. These cottontails belong to the Transition Zone of the Allegheny Mountains, and there is no unquestionable record of their occurrence nearer Washington than White Sulphur Springs and Travellers Repose, West Virginia.

¹Burnaby, Andrew, Travels through the Middle Settlements in North America in the years 1759 and 1760, London, 1775.

In 1861 Haley, in Philp's "Washington Described," p. 22, reported them as formerly roaming over the District of Columbia but not found at that time, although, he continues, it is even quite possible they still exist as stragglers.

Family CANIDAE: Wolves, dogs, foxes, etc.

RED FOX; EASTERN RED FOX.

Vulpes fulvus fulvus (Desmarest).

In form the red foxes are slender and graceful, with long legs, long tail, prominent ears. When in full long fur they appear almost as large as a small collie dog but their body is very light and slender. The usual color is orange rufous, with belly and tip of tail white; legs and back of ears black. The various color forms called *cross fox*, *silver gray*, and *black fox* are darker phases running to complete melanism. An adult male from Wilmington, Massachusetts, measures in total length 1053, tail 403, hind foot 169 mm.; in inches 41, 16, 6.6.

Red foxes are not uncommon about Washington and extend considerably farther south, although there seems to be a general idea that they originally ranged farther north and came to the vicinity of Washington about 1800. During the years from 1768 to 1775, George Washington did a great deal of fox hunting in the vicinity of Mount Vernon and Washington, most of the foxes being of this species, as shown by their making long runs before the hounds and occasionally taking refuge in holes in the ground. D. B. Warden in writing of the District of Columbia in 1816 says "the gray and red fox frequent this region and sometimes carry off pigs, lambs, and poultry."¹

In 1889 Morris M. Green saw a red fox on the west bank of the Potomac River opposite Washington. A specimen in the National Museum collection from the Zoological Park is labeled Virginia and was received October 5, 1894. Another specimen is a young only a few weeks old taken near Rockville, Maryland, by Cecil Allnut, April 2, 1913. In 1917, Dr. Fisher reported the tracks of two red foxes on Plummer Island in the Potomac, where they had been hunting cottontail rabbits on a fresh snow. He and Wetmore saw one on the Virginia shore opposite the Island in 1922.

In November, 1917, N. Hollister told me that a red fox had recently been seen several times in Rock Creek Park and the Zoological Park, and in January, 1920, I saw their unmistakable tracks along Rock Creek above the Joaquin Miller Cabin. In the spring of 1922 young were seen by Smith Riley that had evidently been raised in Rock Creek Park.

It is perhaps well for small game and poultry that they are not abundant, but their considerable value for fur and the chase keeps them under control in any settled region. Still it is to be hoped that they may never entirely disappear from our local fauna.

¹Chorographical and Statistical Description of the District of Columbia, p. 159, Paris, 1816.

GRAY FOX; TREE FOX; SWAMP FOX.

***Urocyon cinereoargenteus cinereoargenteus* (Schreber).**

The gray fox is about the size of the red, but seems smaller because of shorter legs and tail, and shorter fur. Its tail instead of being cylindrical is laterally compressed, with a black dorsal crest and black tip. The general color of the upperparts is coarse gray; sides of belly, legs, and throat, and under surface of tail rich rufous; feet and back of ears and sides of nose black; part of belly and throat white. An adult male from Big Sandy, Tennessee, measures in total length 1,005, tail 372, hind foot 135 mm.; in inches 39, 14.5, 5.5. Weight of one 10 pounds, 2 ounces.

During the years from 1768 to 1775 George Washington recorded in his diary frequent fox hunts in the vicinity of Mount Vernon and about Washington. In 1785, after the Revolution and before his presidency, he again took up fox hunting as a sport. In the very brief entries in his diaries, now on file in the Library of Congress, he does not distinguish the kind of foxes, but as many were quickly treed by the dogs, it is evident that such were of this tree climbing species.

In writing of Bladensburg, Maryland, in 1816, D. B. Warden says, "the gray and red fox frequent this region and sometimes carry off pigs, lambs, and poultry."¹

Specimens labeled Washington, 1852, were listed by Baird in his *Mammals of North America*.

In 1889 Morris M. Green was told by a farmer on the Virginia side of the Potomac opposite Washington that gray foxes were sometimes seen there. In 1895 Dr. A. K. Fisher saw tracks of gray foxes at Munson Hill and other places in Virginia. On June 9, 1916, foxes were reported killing chickens at the Experiment Station near Beltsville, Maryland. An old male and a couple of half grown young were trapped from a family that were visiting the poultry yard at night, and as usual the old male was the first to be caught. One of the young had a few chicken feathers in its stomach. On May 15, 1919, I saw their tracks along the cliffs on Cupid's Bower in the Potomac, and Preble tells me that a few still range the valley of Bullneck Run.

Usually these foxes are kept away from farms by the dogs as they are not very swift and are easily treed. They live and breed in hollow trees or logs, or among rocks, are mainly nocturnal in habits, and are rarely seen, even where common, unless caught in traps or driven to refuge by dogs. Their fur is rather coarse and harsh but prettily colored and in recent years of considerable value.

Family PROCYONIDAE: Raccoons, etc.

RACCOON.

***Procyon lotor lotor* (Linnaeus).**

The raccoons have been called the little brothers of the bear and even Linnaeus described them under the genus *Ursus*, but the resemblance to

¹Chorographical and Statistical Description of the District of Columbia, Paris, p. 159, 1816.

bears is only slight and superficial. They have heavy bodies, long furry tails, naked soles, and full soft coats of fur. They are yellowish or silvery gray with a black mask across the face and eyes, and five black rings around the tail. A male from Dismal Swamp, Virginia, measures in total length 860, tail 285, hind foot 110 mm.; in inches 34, 11.3, 4.4, respectively. A very large and fat individual in Minnesota weighed 30½ pounds, but half that would come near the usual weight when not very fat.

Raccoons are still common about Washington and their long babylike tracks may be seen along Rock Creek in the Park, as well as along the banks of the Potomac and Eastern Branch scarcely beyond the edges of the city. In June, 1914, on the bank of Rock Creek opposite the mouth of Piney Branch, I saw the brown gray fur of a coon's back in a hollow, high up in a big tulip tree. Their tracks are found on muddy or sandy shores along the Potomac River. Coons frequent streams and ponds where frogs, crawfish, and mussels are to be found, and in the autumn they fatten on nuts, acorns, and green corn.

After more than a century of unrestricted hunting they still afford considerable sport for those who care for the all-night coon hunt with dogs and lanterns. A few skins are brought into the markets for fur and at Christmas time nicely dressed fat raccoons may be bought in Center Market by those fond of their rather rich oily meat. If they hibernate at all in this climate it is only for short periods of unusually cold weather. Their tracks are seen at all times of winter in mild weather, and winter food of acorns and nuts seem to be generally abundant.

Family MUSTELIDAE: Weasels, minks, otters, skunks, etc.

EASTERN SKUNK.

Mephitis putida Boitard.

The skunk is a heavy-bodied, short-legged, bushy-tailed little animal, with short ears, small eyes, and naked-soled plantigrade feet. The color is normally shiny black, except for a narrow white stripe between the eyes, a broad white stripe from the back of the head diverging into two side stripes along the back, and usually a white tip to the long bushy tail. Measurements of average adults are, total length 575, tail 229, hind foot, 60 mm.; in inches 22.6, 9, 2.3.

In 1894, a skunk was found under a house in the middle of Georgetown. It was treated with carbon bisulphide and made into a specimen for the Biological Survey collection. There are several other specimens from the District, and the animals are fairly common along the Potomac River above Georgetown, where their tracks may be seen in the dusty roads along the canal, almost any morning. I have found both tracks and burrows on the west side of the Potomac above Chain Bridge, and they have been seen on Plummer Island. Tracks are occasionally seen still nearer the city and sometimes an unmistakable skunk odor blows into town. In 1861, Haley, in Philp's "Washington Described," says, "The skunk is almost as much a nuisance as ever."

It is probable that skunks will never entirely disappear from any exten-

sive part of their original range, as they seem able to adapt themselves to settlement in spite of dogs and traps. Their fur has considerable value, and the skins with narrow white stripes, and excess of black bring the highest price. Skunk skins are often brought to the fur buyers in Washington, and next to the muskrat are one of the commonest furs of the region.

OTTER.

Lutra canadensis canadensis (Schreber).

The body of the otter is long and slender, the tail tapering, the legs short, the feet webbed, the ears short and sharp, the eyes are small, and the fur dense and glossy. The color is dark umber or liver brown, slightly paler below and grayish on throat and cheeks. The measurements of a large male from Louisiana show a total length of 1,170, tail 372, hind foot 135 mm.; in inches 46, 14.6, 5.3.

Otters are still found along the Potomac River and most of the streams in and around the District of Columbia. Almost every winter tracks are seen or some of the animals captured. In the National Museum collection are specimens labeled Washington, D. C., No. 4929, J. C. McGuire, without date; one taken at Eastern Branch, near Bennings, by E. S. Schmid in 1895; one killed at Seven Locks on the Canal above Glen Echo, by C. S. Scheffer, in 1907, and a skin of an immature individual from the Zoological Park labeled Virginia, 1902, W. H. Spangler. In 1909, Kenneth Beale saw a fresh skin at a local fur store, said to have come from Virginia only three miles from Washington, D. C. J. H. Riley remembers one killed in a creek near Falls Church when he was a boy. A. B. Baker reported an otter killed on the ice at Bennings in 1900; tracks were seen at Seven Locks on the Canal in 1909, and on Plummer Island in 1910 and 1922. Major W. A. Frankland saw a large otter in Rock Creek above the bridge at the northern end of Rock Creek Park, on April 10, 1920, and A. H. Hardisty saw one swimming across the Potomac near Seneca the same month.

In habits the otters are largely aquatic, being powerful, rapid swimmers but rather clumsy on land. In winter they travel long distances under the ice, but occasionally come out and run over the ice or slide on the snow. Most of their food is taken under water and consists largely of fish, crustaceans, and frogs. They are usually wary and not easily trapped, and as they have practically no enemies but man they hold their own fairly well over even the settled parts of the country. Their skins are valuable, ranging generally from \$10 to \$20 for good pelts. The unplucked fur is dark brown, glossy and durable, and the plucked fur is very fine and soft, of a golden brown color.

MINK.

Lutreola vison lutrecephala (Harlan).

The mink has a long slender body, short legs, fuzzy tail, short wide ears, and small beady eyes. Its fur when prime is full and soft, with a loose covering of glossy outer hairs. The color, mink-brown, varies from liver brown to dark umber; the tail is blackish toward the end, usually the chin

and sometimes the throat have a few irregular white spots. The measurements of an adult male from Branchville, Maryland, show total length 640, tail 229, hind foot, 81 mm.; in inches 25.2, 9, 3.2. The female is much smaller, 525, 182, 64 mm.; in inches 20.6, 7.2, 2.5. A fair-sized male taken at Chain Bridge, November 27, 1920, measured 610, 225, 68, and weighed $2\frac{1}{2}$ pounds.

Mink are still fairly common about Washington, and their tracks may be seen in the snow, or on muddy or sandy shores along almost any stream about the city. They follow down Rock Creek into the Park, and sometimes into the Zoological Park, and below under Connecticut Avenue Bridge. They are found along Eastern Branch, and all along the Potomac River. The high price of fur for the several years past has stimulated trapping and the number of mink caught around Washington each winter keeps them down to a minimum of abundance. They are wary and secretive in habits, not easily caught in traps except by the use of scented bait, and great care is necessary in placing and concealing the traps. They are largely nocturnal in habits, living in holes or hollow banks, under drift wood, or in hollow logs or trees. They swim and dive with much freedom and skill, and climb trees readily, so they have as many means of escape from enemies as they have resources in capturing their prey. They live on fish, frogs, crustaceans, mice, and small rodents, birds, poultry, or almost any small game they can capture. At times they do considerable damage in the poultry yards, but their value for fur partly pays for their occasional depredations while it keeps their numbers well reduced.

J. H. Riley tells me of an old trapper who caught six minks in one trap inside of two weeks in the town of Falls Church, Virginia, and also of an old mink that visited his hen house and killed 22 chickens one night, returned the next night and killed 16 chickens, and the next day was caught by a dog as it returned for more.

NEW YORK WEASEL; ERMINE.

Mustela noveboracensis noveboracensis (Emmons).

The weasel is a slender-bodied little animal, with short legs, long slender tail, short ears, beady eyes, sharp nose, and keen expression of face. Its color in summer is dark brown, darkest on face, and black on the outer two inches of tail; the lower parts are rich yellow. In winter at Washington it is usually lighter brown with the belly pale yellow or nearly white. Farther north and in the mountains the species becomes pure white in winter except for the tip of the tail, which is always black. Two taken in winter at Sandy Spring and Gaithersburg, Maryland, were in the white winter coat. An adult male measures in total length 390, tail 132, hind foot 43 mm.; in inches 15.4, 5.2, 1.7. A female 315, 95, 35 mm.; in inches 12.4, 3.7, 1.4. A breeding female from Mount Vernon measured 305, 100, 34, and weighed $3\frac{1}{4}$ ounces.

Weasels are by no means rare about Washington. Their tracks are occasionally seen in the snow or along the shores of streams. In the National Museum collection are a number of skins labeled Washington and

caught near the city. One of these I caught in April, 1896, a short distance above Chain Bridge on the west side of the Potomac River in a trap set among broken rocks for wood rats. J. H. Riley has taken a number at Falls Church, Virginia. Dr. C. W. Richmond tells me that a weasel was caught about 1887 near the old Central High School on 7th and P Streets Northwest. An old female and a nearly full-grown young one were obtained from a farmer's boy near Mount Vernon by E. A. Preble, May 11, 1920, the stomach of the old one containing remains of a mouse and a lizard, that of the young one the remains of a meadow mouse. Preble tells me that he occasionally sees their tracks in the valley of Bullneck Run, Virginia.

Weasels are bold and inquisitive hunters, often coming about buildings, or even into towns in pursuit of their principal prey, mice and rats and other small rodents. Occasionally they do some mischief in poultry yards, killing considerable numbers of young and old birds, thus making a bad reputation which is generally remembered longer than the great amount of good they do in destroying rodent pests. They are cruel, bloodthirsty little savages with nothing lovable in their natures, but their fearless self-confidence often compels our admiration. In the north their white fur with the black tipped tail is of some value as ermine, but in this latitude their plain brown skins are rarely saved even when they get into the traps set for minks and other fur bearers.

Order INSECTIVORA: Insect eaters.

Family TALPIDAE: Moles.

EASTERN MOLE.

Scalopus aquaticus aquaticus (Linnaeus).

The mole is a compact little animal with no functional eyes or ears, a beaklike, naked nose, large spadelike front feet with five rigid claws, small hind feet, no visible legs, short, nearly naked tail, and dense plushlike fur of a brassy brown color. An average adult measures in total length 163, tail 28, hind foot 20 mm.; in inches 6.4, 1.1, .74.

Moles are abundant around Washington up to the edges of the city and on the vacant lots next to the woods. Their characteristic ridges are seen on open lots, even among the paved streets, but in old fields and pastures are most conspicuous.

Moles are great burrowers and with their large front feet, worked by powerful muscles, push up ridges along the surface of the ground by main strength, working so rapidly that a new ridge may be seen rising at the rate of about a foot a minute. They also make deep and elaborate burrows in the earth, and push up mounds of earth from below, but are best known by their tunnels near the surface, which are their feeding grounds, where earthworms and numerous insects and small animal forms are encountered and greedily devoured. Generally their stomachs contain mainly earthworms or insect remains, but sometimes they contain a little vegetable matter. Moles are often accused of destroying bulbs, plants, and crops, but the

real culprits are usually the pine mice or meadow mice, which follow their runways or make similar, but slightly smaller, tunnels of their own.

STAR-NOSED MOLE.

Condylura cristata (Linnaeus).

The star-nosed mole is almost as large as the common mole with a much longer and at times much swollen tail, and a radiating disc of delicate pink, fleshy tentacles surrounding the flattened end of the nose. The minute and sightless eyes are buried under the skin, and the ears are mere openings under the fur. The front feet are short and spadelike, but not so wide as those of the mole. The fur is dense and soft, of a brownish black color. Adults measure in total length 192, tail 72, hind foot 28 mm.; in inches 7.5, 2.8, 1.1.

Star-nosed moles are not common about Washington, but occasionally one is found and usually saved for a specimen. Haley in Philp's "Washington Described," p. 22, 1861, reports the star-nosed mole as finding its southern limit here. An old specimen in the National Museum is labeled Corcoran Branch, July, 1858, Elliott Coues. On May 22, 1888, Morris M. Green found a nest of five about half grown young under an old log on the flats between the canal and the river about a mile above Georgetown. In 1889 Dr. Fisher found the skull of one in the stomach of a screech owl, taken near Washington on June 2,¹ and later found 12 skulls in the pellets of barn owls from the Smithsonian tower.

At Falls Church, about 1892, Riley saw one that had been drawn up alive in a bucket of water from a well, and in 1899 he secured one that was dug out by a dog and was mounted for the National Museum collection. On May 1, 1898, W. G. Johnson found a quarter-grown young at College Park, Maryland, and sent it to the Biological Survey collection. On November 3, 1907, one was found dead in a road near Branchville, Maryland, by Prof. F. E. L. Beal. On May 20, 1910, one was caught by a cat a mile south of Glendale, Maryland, and brought to the Biological Survey by Dr. Rodney H. True. On February 1, 1913, an adult male was caught by T. H. Scheffer near a small stream in a marsh near Brookland, D. C. It had the greatly swollen tail and sexual glands of the breeding season. Another male caught near the same place on March 3 in a mole trap showed less sexual development and a less swollen tail. Others have been taken near Chevy Chase, Brightwood, Woodside, Cabin John Bridge, Lanham, Laurel, and Marshall Hall.

These moles are not easily caught in traps and may be much more common than is generally supposed. They burrow in the damp soil of marshes and low lands, in places making ridges like those of the common mole, but usually pushing up little hills of black earth in disposing of the material from their deeper burrows.² They rarely come above the surface of the ground unless by accident or in the excitement of the breeding season in late

¹Hawks and Owls of the United States, Bull. 3, Div. Orn. & Mamm., U. S. Dept. Agr., p. 171, 1893.

²Merriam, C. Hart, Mammals of the Adirondack Region, p. 146, 1884.

winter or early spring. In life the delicate fleshy, fingerlike filaments radiating from the end of the nose are in constant motion apparently in the effort to touch, feel, and recognize objects with which they come in contact in their subterranean life, so taking the place of the functionless rudiments of eyes in the search for earthworms and insect food.

Family SORICIDAE: Shrews.

SHORT-TAILED SHREW.

Blarina brevicauda brevicauda (Say).

These are the largest of our shrews, with heavy bodies, short legs, short tails, pointed noses, minute eyes, concealed ears, and velvety fur. Their color is plumbeous or sooty black, with a metallic luster when the fur is smoothed down. The teeth as in other shrews are tipped with dark brown. A Washington specimen measures, total length 112, tail 23, hind foot 15 mm.; in inches 4.4, .9, .6. This is smaller than the typical form farther west and north, but not quite small enough for *Blarina brevicauda carolinensis* farther south. A specimen from the Rappahannock River near Warsaw, Virginia, can, however, be referred to *carolinensis*.

The short-tailed shrews are among the commonest small mammals of the district, being found in the woods and fields, and in brushy or weedy places up to the very edges of the city, and even on vacant lots where there is sufficient cover of old grass, weeds, boards, or suitable protection from the light of day and overhead enemies. Like other shrews their eyes are very small and probably of less use to them than the pointed, flexible nose in finding the insects and other small animal life on which they feed.

They burrow mainly near the surface, in rich mellow soil, make roadways over the surface of the ground under cover of old vegetation, or follow the roadways and tunnels of the meadow mice and pine mice. At the lower end of the Zoological Park in 1893, in a Schuyler mouse trap, I caught one of these shrews by the neck and a meadow mouse by the hips. The trap was set across a runway and evidently the shrew was pursuing or had hold of the back part of the mouse when they ran through my trap and were both caught.

They are very fond of meat and eat any mice or small animals or even their own kind when found in traps and are of great value in keeping down the abundance of small rodents, as well as insects, bugs, worms and snails.¹ While savage little brutes in their own small world they are practically harmless and very useful animals in their relations to human economy.

LEAST SHORT-TAILED SHREW.

Blarina parva (Say).

These are the smallest of our short-tailed shrews, but with heavier bodies than the small species of *Sorex*. Their feet are small, tails short, noses

¹See Merriam, C. Hart, Mammals of the Adirondack Region, pp. 164-173, 1884; and Shull, A. Franklin, Habits of the Short-tailed Shrews, Amer. Naturalist, Vol. XLI, pp. 449-522, 1907.

pointed, eyes minute, ears hidden, and fur soft and velvety. Their upperparts are sepia brown, the lowerparts ashy gray. An adult male from Brightwood, D. C., measures in total length 78, tail 18, hind foot 10 mm.; in inches 3.1, .7, .4.

Although widely distributed from New Jersey to Nebraska, Texas, and Georgia, these little shrews seem always scarce or so obscure in habits as to be rarely found except by owls. In 2,262 pellets of barn owls from the Smithsonian tower, Dr. Fisher took 61 of their skulls, and in pellets from long-eared owls from Munson Hill, Virginia, there were 23 of their skulls among 176 of other small mammals.¹

In 1890 Prof. W. B. Barrows, then a member of the Biological Survey, picked up one of these little shrews in Brookland and brought it to the office. In 1896 I caught one near Brightwood in an old grassy field where the Military Road enters Rock Creek Park, and the same year J. H. Riley caught one in an old stump in a field at Falls Church. In 1913, 1914, and 1915, A. H. Howell collected four specimens near his place at Woodridge, a suburb in the northeastern quarter of Washington. A number of specimens have been taken by George Marshall at Laurel, Maryland.

Little is known of the habits of these shrews, except that specimens are occasionally taken in traps set in field mice runways or in tiny runways under old grass that seem to be made by the shrews themselves for their convenience in getting about over the surface of the ground and catching their insect food.

BACHMAN SHREW; CAROLINA SHREW; SOUTHERN SHREW.

Sorex longirostris Bachman.

This is the only eastern *Sorex*, except *fisheri* from the Dismal Swamp, that has the third unicuspid tooth smaller than the fourth. Its size is very small, the ears rather conspicuous, the nose not longer than in other shrews. The color of the upperparts is chestnut brown, of the underparts ashy gray. Measurements of a series of specimens from North Carolina show a total length of 86, tail 32, hind foot 10.7 mm.; in inches 3.4, 1.3, .45.

Hollister reports a specimen of this rare little southern shrew in the National Museum, collected by C. Girard, labeled Washington, D. C., and entered in the museum catalogue April 19, 1855, as No. 637. There seems to be no clue to the exact locality where it was collected or to the exact date of collection, but Bachman's type of the species described in 1837 was taken in the swamps of the Santee River, South Carolina, and others have been taken on dry uplands. The only other specimen from the vicinity of Washington was collected by C. K. Rorebeck, at Falls Church, Virginia, January 3, 1897, and is now in the National Museum collection. One taken by Dr. M. W. Lyon at Chesapeake Beach, Maryland, July 3, 1908, is the next nearest to Washington. Other specimens have been taken in Georgia, South Carolina, North Carolina, Alabama, Indiana, and Illinois.²

¹Hawks and Owls, Bull. 3, p. 141, 1893.

²Hollister, N., Proc. U. S. Nat. Mus., vol. 40, p. 379, 1911.

MARYLAND SHREW.

Sorex fontinalis Hollister.

This tiny shrew is one of the smallest known species of its genus and probably next to the smallest known mammal of North America. It is very slender and delicate with long sharp nose, minute eyes and relatively long tail. Its color is sepia brown above, brownish gray below. Measurements, total length 90, tail 31, hind foot 10 mm.;¹ in inches 3.51, 1.4, .4.

In February, 1896, I caught three of these little shrews in mouse traps set under logs, and in runways through the sphagnum moss in a cold swamp near Hyattsville, in the same locality and situations with the lemming mouse (*Synaptomys*), and later two other specimens were taken there by Dr. Fisher.

On November 6, 1898, Gerrit S. Miller, Jr. caught one in a cold spring swamp near Beltsville, Maryland, and the three from Laurel, Maryland, were caught by George and E. B. Marshall. The one from Sandy Springs was found dead in a path so no idea of habits or habitat were obtained.

In 1920 only 13 specimens of *Sorex fontinalis* were known. These were all collected near the District of Columbia, in Maryland, at localities as follows: Beltsville, 2; Hyattsville, 5; Hollywood, 1; Laurel, 4; Sandy Springs, 1. The fact that none have been taken in the great amount of trapping on the uplands indicates a mainly swamp habitat for the species. Nothing is known of their habits except the little gained through specimens caught. They live under cover of moss, logs, and marsh vegetation, through and under which they make tiny burrows and roadways. Some of those caught were in meadow mouse or lemming mouse runways. They take meat bait and, like other shrews, probably live mainly on insects and other forms of small animal life found on or under the surface of the ground.

LEAST SHREW.

Microsorex winnemana Preble.

In size, as its name indicates, this is the smallest of all the shrews and therefore the smallest known mammal in North America, being very slender and delicate, with its tail about three times as long as its hind foot. In color the upperparts are grayish brown, the lowerparts ashy gray. Measurements of type: total length, 78, tail 28, hind foot 9 mm.; in inches 3.08, 1.1, .35.

This rare species was discovered and described by Edward A. Preble of the Biological Survey, who says, "On April 25, 1903, while searching for salamanders * * * on the Virginia shore of the Potomac above Plummer Island [near Stubblefield Rapids] I dislodged from the decayed interior of a large fallen log a tiny shrew. The rarity of any species of long-tailed shrew in the vicinity of Washington caused me to take special pains in preserving the specimen. Later, when I examined it carefully, I was surprised to find that it belonged to the genus *Microsorex*, hitherto unknown

¹For detailed characters see original description by N. Hollister, Proc. U. S. Nat. Mus., vol. 40, p. 378, 1911.

to occur south of Ohio and New York. It was apparent that the specimen represented an undescribed form, but its characterization was deferred in the hope that other specimens would be detected. This did not occur until January 24 of the present year [1910] when William Fink of Berwyn, Maryland, found a second specimen in the decayed heart of a dead chestnut tree which he cut from a dry hillside at some distance from water." The detailed description then follows¹ and under *Remarks* he adds "*Microsorex winnemana* is the smallest species of shrew (and therefore the smallest mammal) thus far discovered in America. The specific name *winnemana* (beautiful island) is in allusion to Plummer Island, the home of the Washington Biologists' Field Club, near which the type specimen was taken."

Here is a field to inspire any energetic young naturalist, a remarkable species with only two specimens known, and a fair clue given to habits and habitat. Who will be the next to bring in specimens, dead or alive, and add something to our meager fund of knowledge of the wild life about us?

Order CHIROPTERA: Bats.

Family VESPERTILIONIDAE: Northern Bats.

HOARY BAT.

Nycteris cinerea (Beauvois).

The hoary bat has 32 teeth, is the largest of our eastern bats, with ears short and rounded, the top of the feet and tail membranes well furred, and the fur full and soft. Its color is yellowish brown frosted with white, its throat and wing linings buffy. Average adults measure in total length 135, tail 58, hind foot, 11 mm.; in inches 5.2, 2.26, .45. Spread of wings 15 to 16 inches.

A specimen taken October 2, 1892, at Laurel, Maryland, one taken October 20, 1897, and another May 26, 1904, at Chain Bridge, seem to be the only records for the vicinity of the District of Columbia; but other records from Baltimore, Maryland, New Jersey, South Carolina, and Pennsylvania, bring its range on all sides of the District. It is a wide-ranging migratory species, and evidently covers the whole area. With a boreal breeding range across the continent, and a migratory range in winter from Canada to at least the southern border of the United States, it may be looked for at Washington in the fall and spring migrations. Its size readily distinguishes it on the wing from the smaller bats, but it is a late and rapid flyer and not easily secured for specimens. Dr. Fisher tells me that this is the only bat known to the District fauna that has not been taken in the cabin at Plummer Island.

RED BAT.

Nycteris borealis borealis (Müller).

The red bat has 32 teeth, is medium sized, with short, rounded ears, mainly naked inside and on rims, and with the top of tail membranes and

¹Proc. Biol. Soc. Washington, vol. 23, p. 101, 1910.

feet well furred. Its color is bright rusty or pinkish yellow, with a slight frosting of white-tipped hairs over back and breast. In total length it measures 117, tail 52, hind foot 10, spread of wings 330 mm.; in inches 4.5, 2.1, .4, 13.

This is one of the commonest bats to be seen flying about in the evenings, either in the open places in the woods, or about the houses in the city. It often comes out so early in the evening that its bright colors are easily recognizable as it flies softly about in search of flying insects. Apparently it is in part resident here, although a migratory species in at least the northern part of its range. Specimens collected about Washington bear dates of April, May, June, July, August, September, October, and November. At Arlington on March 1, 1919, I saw several flying about on a warm evening soon after sundown, while it was so light that their unmistakable colors could be recognized. The evening was warm and still, but the nights had been frosty for a week past, and very cold only two weeks before. Wetmore saw half a dozen of these bats flying about before dusk at the border of the woods near Lorton, Virginia, on November 17, 1917, and collected one of them. Prof. Cooke saw one near his "Wickiup" at Viresco on the Virginia side of the Potomac at midday January 1, 1913. It lit on the ground near him and its bright red fox color was very striking. A warm and springlike day had probably brought the bat out of its hibernating quarters.

An old female collected near Falls Church, Virginia, by Riley, June 3, 1905, contained 3 large embryos nearly ready for birth. A female shot by A. H. Hardisty near the northwest corner of Rock Creek Park, May 11, 1918, contained 3 embryos.

In a paper on the number¹ of young of this bat Dr. Marcus Ward Lyon, Jr., records an adult female nursing four young brought into the National Museum alive by Mr. C. J. Lawson of Washington, D. C., on June 18, 1902. Photographs of the family were secured and shown in a plate, a young one at each of the adult's nipples, where they held on with great tenacity, each having in its mouth a good deal of its mother's hair in which its hooked milk teeth firmly caught. The young were less than a third grown, but their combined weight, alive, was 12.7 grams, while that of the mother was but 11 grams.

In the Merriam collection is a female taken June 22, 1889, with two young clinging to her. On July 11, 1908, a half grown red bat was picked up on Seventeenth Street near the Corcoran Art Gallery, where it had probably fallen while learning to fly. Another young apparently just able to fly was collected at Plummer Island July 15, and another near Washington, July 24. Two to four young are the usual numbers. Little is known of the breeding habits or whether the young always cling to the mother until old enough to fly or whether they hang up part of the time in the leafy tips of branches, heads downward, where their parents spend the daylight hours.

As with other bats their food consists of a great variety of flying insects caught on the wing.

¹Lyon, Dr. Marcus Ward, Jr., Observations on the Number of Young of the Lasiurine Bats. Proc. U. S. Nat. Mus., vol. 26, p. 425, 1903.

SILVER-HAIRED BAT.

Lasionycteris noctivagans (LeConte).

These bats have 36 teeth; are medium in size, with wide, naked, somewhat quadrate ears; upper surface of tail membrane hairy near the base; fur long and soft. Color black or dusky brown with silvery tips to the hairs over back and belly; ears, feet, and membranes black or blackish. Measurements, total length 116, tail 47, hind foot 10, expanse 298 mm.; in inches 4.5, 1.85, .4, 11.7.

This is a wide ranging boreal species over the northern and mountainous parts of the continent, and a few specimens have been taken about Washington during their migrations southward. On November 12, 1885, Dr. Fisher shot one between Arlington and Rosslyn, Virginia, and in the National Museum collection are skins labeled Washington, D. C., January, 1893, and another Smiths Island, Virginia, September 3, 1893. Dr. Fisher collected another at Plummer Island, October 6, 1906, and Hardisty one near Georgetown October 17, 1918. On November 12, 1905, Preble saw five or six bats on an open hillside in the woods north of Piney Branch and west of Eighteenth Street, some of which were recognized as almost certainly of this species. All of these dates indicate migratory records.

In northern New York Dr. Merriam records the silver-haired as the most abundant breeding species of bat, and says the two young are born about the first of July.¹ At Ossining, New York, where the species is abundant, Doctor Fisher took 28 out of the siding of a house in June, which would indicate a breeding record.

LARGE BROWN BAT.

Eptesicus fuscus fuscus (Beauvois).

Total number of teeth 32; size rather large; ears of medium length, pointed, and wholly naked; wing and tail membranes mainly naked; fur glossy. Color bright hazel or hair brown, paler on belly; ears and membranes dark brown or blackish. Measurements, total length 112, tail 42, hind foot 11, expanse 300 mm.; in inches 4.4, 1.6, .45, 11.8. Weight of adult male 15.2 grams, of female 14.2 grams.

These large brown bats are common residents about Washington and may be recognized on the wing by their size and brown color. They fly at evening about our front doors and along the streets and alleys, as well as in open spaces in the woods, with a strong, rapid, but very erratic flight as they pursue their winged prey. They are resident throughout the year, breeding in summer and hibernating in nooks and corners of the houses in winter either in the same dark recesses where they spend the daylight hours or in special cavities selected for warmth and protection. They often enter open doors and windows and fly about the rooms, catching insects and lighting on the ceilings or walls. Open and vacant buildings are favorite hunting grounds for them. They live also in hollow trees, and in caves and clefts among the rocks, and have been found hibernating in rolled-up

¹Merriam, C. Hart, *Mammals of the Adirondack Region*, p. 190, 1884.

awnings. In the cabin on Plummer Island Dr. Fisher caught one in a mouse trap set on the window sill, January 21, 1907. Almost every winter during the coldest weather of January specimens are brought in from apartment houses or private residences where found flying about the rooms, awakened from their hibernation by the heat. These are always found to be excessively fat, but with empty stomachs, showing that they have been for a long time dormant.

The earliest seen flying outside were reported by Dr. T. S. Palmer on March 22, 1911, on Biltmore Street. They were large, brown bats and probably of this species. The evening was warm, and maples, elms, and poplars were in blossom, but there were no leaves on the trees, and few summer birds had arrived. On March 26, 1919, they were seen flying about my front door at 1834 Kalorama Road, while it was light enough to recognize the species. The forsythia, Japanese quince, and hyacinths were then in full bloom. These bats remain active in autumn up to October.

Usually in the West but one young is raised in a season, but there are records of two. On July 31, 1919, I found a pair dead in front of Stoneleigh Court on Connecticut Avenue, where they had evidently been knocked down and killed, or caught in the building and thrown out. The female contained two minute embryos the size of No. 8 shot, that would have been born in May or June of the next year. Another was taken August 7 in the same condition. Riley obtained a young with eyes not yet open on June 14, 1899, from a colony in an old church in Falls Church, Virginia.

From their habit of hunting about houses they are presumably one of the most useful species of bats as insect destroyers.

EVENING BAT; RAFINESQUE BAT.

Nycticeius humeralis (Rafinesque).

Total number of teeth 30, only one upper incisor and one upper premolar on each side. Size small, ears small, pointed, and with short tragus, tip of tail free of membrane. Color dark brown with very black ears and membranes. An adult specimen measures in total length 95, tail 35, hind foot 9 mm.; in inches 3.7, 1.4, .35. Weight of adult female, 9.5 grams.

This is an abundant southern bat, occurring but rarely as far north as Washington. Two specimens taken near Washington by Wm. H. Rhees, May 22, 1882, are in the National Museum collection. A female was taken at Linden, Maryland, August 11, 1896, and one taken at Oxon Hill, June 2, 1903. A female in the Biological Survey collection, U. S. National Museum, was taken at Plummer Island, September 7, 1910, by H. S. Barber. At Falls Church, Virginia, J. H. Riley reports specimens taken July 28, 1898, July 9, 1902, July 28, 1906, and July 29, 1914. A female taken by A. H. Hardisty, July 9, 1918, in Prince George County, Maryland, near the District Line, apparently had young, as the single pair of subaxillary mammae showed signs of being used.

On May 17, 1919, one of my Boy Scouts brought me a bat of this species that he had found in a crack near the top of a telephone pole at the north end of Connecticut Avenue Bridge. This also was a female and later

when it died in captivity was made into a specimen and turned in to the Biological Survey collection.

On May 20, 1920, Alex. Wetmore brought me a specimen taken in his house the previous evening at 1819 Hamline Street, Northeast. It was a female containing two small embryos.

While specimens have been taken as far north as Riverton, Virginia, and Carlisle, Pennsylvania, the main range of the species is in the lower Austral Zone west to Texas. With all the collecting done about Washington the number of specimens is so small that the only conclusion is that we are beyond the edge of its main range.

GEORGIAN BAT.

Pipistrellus subflavus (F. Cuvier).

Total number of teeth 34; size small; ears small, pointed, nearly naked; tragus short and wide; fur short and woolly; color pale russet or yellowish brown above, lighter and brighter below; ears and membranes light brown. Measurements, total length 84, tail 37, hind foot 8 mm.; in inches 3.2, 1.45, .32.

This is generally the most abundant small bat in and around Washington. Specimens have been taken during every month and at frequent intervals from April 29 to October 17. They may be seen every warm summer evening, flitting softly between the trees in the parks, or along the streets with irregular zigzag flight as they catch their food of flying insects. Often their pale colors can be recognized when they first appear in the early dusk of evening, their small size distinguishing them from the brighter-yellow red bat. During the day they sleep in some dark retreats in buildings, or in hollow trees, or under bark.

In the Merriam collection, now in the U. S. National Museum, are 16 specimens taken by Dr. Richmond May 14, 1887, under the roof of a barn near the Soldiers Home. They were part of a colony suspended in a cluster in somewhat the form of a hornets' nest from the roof in one corner of the building. Those taken were captured after the colony was dislodged. On May 3, 1896, Dr. F. V. Coville found one hanging in a bunch of elm leaves low over the water at High Island and gave it to me for a specimen. On August 18, 1904, J. H. Riley caught one in the bird gallery in the Smithsonian building. On April 29, 1914, Dr. T. S. Palmer brought me one that he had caught in his house on Biltmore Street, where it may have entered through a window, or come out of some hibernating retreat.

A specimen taken by A. H. Hardisty near Brookland on June 1, 1918, contained two embryos and had the usual arrangement of mammae, one on each side of the breast, more nearly subaxillary than pectoral. Another taken by Preble near Washington, June 3, 1899, contained two embryos, and in the Merriam collection in the U. S. National Museum is a female taken July 3, 1888, that was nursing young.

DUSKY GEORGIAN BAT.

Pipistrellus subflavus obscurus Miller.

In size and proportions about the same as *subflavus* but color duller and

darker, less yellowish and with dark tips of hairs on back more conspicuous.

This dark colored northern form described by Gerrit S. Miller, Jr., from Lake George, New York, is probably not a resident of the District. Two specimens taken as they were flying over the river near Plummer Island, September 9, 1905, are typical in color. They may have migrated from their northern habitat, or merely wandered out of their regular range after the breeding season was over.

LITTLE BROWN BAT.

Myotis lucifugus lucifugus (LeConte).

Total number of teeth 38, 2 upper incisors, and 3 upper premolars to each side. Size small; ears short, not reaching tip of nose, narrow and pointed with slender tragus; membranes mainly naked; fur smooth and glossy. Color, dull hazel brown above, buffy below, ears and membranes dusky brown. Measurements, total length 86, tail 37, hind foot 9, forearm 38.8, expanse of wings 260 mm.; in inches 3.4, 1.45, .35, 1.5, 10.2.

This is the common little brown bat of Washington and vicinity, and many specimens have been taken in May, June, July, and August. In 1888 and 1889, Morris M. Green and Dr. C. W. Richmond collected large numbers of them in the crevices between the timbers of the Old Long Bridge across the Potomac. Of these 10 adults and 15 young taken June 16, and a nursing female taken July 3, are in the Merriam collection, now a part of the U. S. National Museum collection. An old male and female and two half-grown young were collected at Plummer Island, August 1, 1897, by Dr. W. H. Osgood, and two males were collected August 24 and 31, by Dr. A. K. Fisher.

While common breeding summer bats, their winter habits and their places of hibernation are little known. In 1920, the first small bats seen, apparently of this species, were flying about in the woods on the evening of March 19, but some of the Boy Scouts reported small bats seen a week earlier.

At Falls Church, Virginia, J. H. Riley shot two females, each containing one large embryo, one on June 26, 1906, and the other on June 21, 1907.

SAY BAT.

Myotis subulatus subulatus (Say).

Total number of teeth 38; size small; ears long and narrow, reaching beyond tip of nose; fur soft and glossy. Color bright hazel brown above, buffy brown below; ears and membranes light brownish. Measurements, total length 95, tail 41, foot 9, forearm 35, expanse 247 mm.; in inches 3.7, 1.6, .35, 1.4, 9.7.

The Say bat closely resembles the little brown bat, but specimens are readily distinguished by longer ears, which laid forward reach well beyond the tip of the nose. It seems not to be very common, but occasionally one is taken near Washington. In the National Museum collection is a specimen taken by P. L. Jouy, at Alexandria, Virginia, in August, 1875. Gerrit S. Miller, Jr., took two at Forest Glen on May 10 and 26, 1896. Another

was taken in the Smithsonian grounds by John J. Veit, September 23, 1919. In the Biological Survey collection are five taken at Plummer Island, March 27 and 31, May 28, August 17, and September 14, from 1902-1910, by Fisher, Osgood, McAtee, Maxon, and Barber.

LEAST BROWN BAT.

Myotis winnemana Nelson.

From *Myotis lucifugus*, which it resembles, this tiny bat may be distinguished by its smaller size, smaller ears, and shorter forearm and blackish face. The color is bright chestnut-brown above, grayish brown below, muzzle and sides of head dusky, ears and membranes black. Measurements of type specimen, total length 82, tail 39, hind foot 8, forearm 30.5, expanse of wings 225 mm.; in inches 3.2, 1.5, .3, 1.2, 8.8.

This smallest of our eastern bats was described in 1913, by Dr. E. W. Nelson, from three specimens taken on Plummer Island in the Potomac River, 10 miles above Washington. The type and one topotype are adult males collected by Dr. A. K. Fisher, August 24 and 31, 1907, as they flew about in the cabin after dark. The only other specimen then known was a female taken from a hibernating colony of bats in a cave at Rutland, Vermont, by George L. Kirk, on April 10, 1913. Apparently it is a rare species or more would have been taken. Dr. Nelson considered it our eastern representative of the *M. californicus* group.